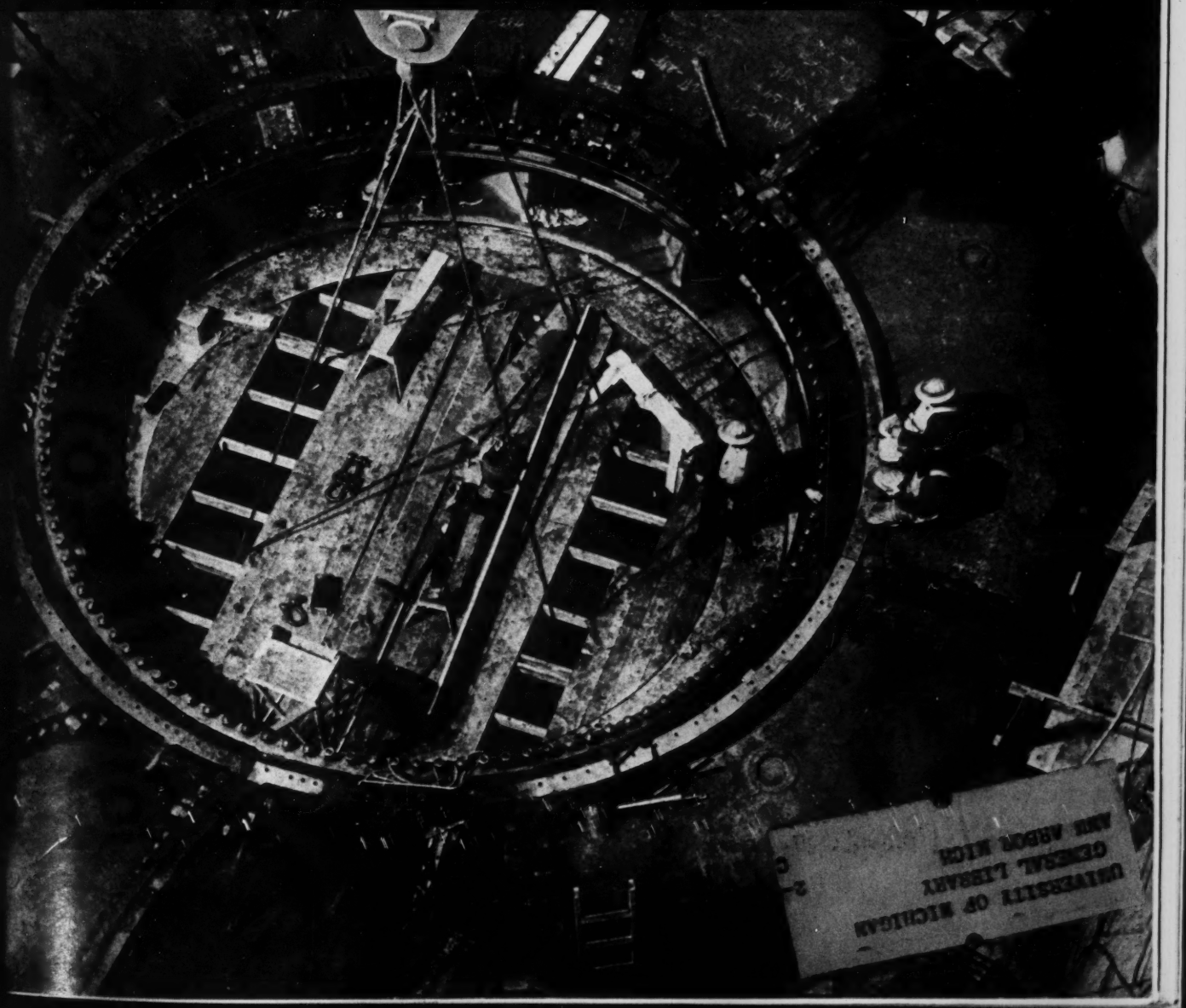
ENGINEERING NEWS-RECORD

ish completion of giant Grand Coulee turbine as smaller units go into operation this week.



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NRPB urges funds for design of public works reservoir

Six-year plan outlines three billion dollars of federal and federal-aid construction during fiscal 1942

Congress should immediately establish a revolving fund to cover the cost of preparing plans and specifications on a reservoir of public works projects to be undertaken in a post-war emergency, the National Resources Planning Board recommends in a report transmitted approvingly to Congress by the President. The report is the first specimen of the six-year public works plan which the President last summer directed to be prepared annually and submitted concurrently with the budget. (See *ENR*, July 11, 1940, p. 59 and Feb. 20, 1941, p. 290.)

As a six-year plan, the report is not very impressive—partly owing to lack of time for its preparation. It consists mainly of a detailed analysis of the construction features of the fiscal 1942 budget (plus money carried over from previous years) broken down by projects and types of work. As far as future planning is concerned, the report simply gives total dollar figures for several broad classifications of federal works now planned, not broken down by years or by projects.

The 1942 budget, NRPB states, provides for $3,157,768,000 worth of construction either to be carried out by the federal government or aided through grants, loans, or guaranties of loans. Direct federal construction, totaling $1,156,768,000 consists of $273,436,000 for water use and control; $123,949,000 for transportation (waterways, airports, and the Panama Canal); $91,100,000 for housing; $52,624,000 for government buildings; $20,208,000 for public land development; and $595,451,000 for defense. This last, like all defense budget estimates, is largely meaningless.

Construction aided by government grants and loans—principally WPA, federal-aid roads, and USHA housing—totals $1,166,000,000, while work aided by government guarantee of loans—FHA housing—totals $835,000,000.

Somewhat ironically, this first attempt at overall planning of public works comes in a year when future scheduling of non-defense works is being largely eliminated. The future portion of the program as presented, therefore, is offered not so much as a set of projects to be immediately carried out, but as a contribution to a reservoir of post-war construction.

Projects proposed for direct federal construction after the fiscal year of 1942 total $2,346,013,000. (No estimate is given for loan and grant projects.) By far the largest group consists of water projects amounting to $1,679,000,000. Next largest is government buildings at $303,804,000.

Of these proposed projects, about $667,000,000 worth are in shape to be undertaken immediately if funds were available. To put the remainder in the same shape would require expenditure of some $85,000,000 for engineering.

In order to bring these projects along and to add others to the reservoir, NRPB recommends that a revolving fund to cover design costs be set up. This would be administered by the President, distributed to federal and non-federal agencies, and reimbursed to the fund as part of the cost of construction when the projects are actually built.

It is also recommended that Congress now authorize certain of the proposed projects mentioned above, so that there would be no legal obstacles to their immediate construction when money is provided. Similarly, NRPB urges that Congress now provide funds for advance purchase of sites.

Photo by Harris & Ewing

Buenos Aires builds an underground parking garage

In Buenos Aires where the streets were laid out on the old Spanish custom of making them narrow, so they would be easier to defend and give more shade from the sun, parking space has become almost a nonentity; even more than in metropolitan American cities.

To solve the congested traffic problem, the first step taken by the city's engineers was to demolish literally hundreds of old buildings in the heart of the city and construct a modern landscaped recreational park. Beneath this plaza was then constructed an underground automobile parking garage.

The structure is built in two sections, each of 1,000 car capacity, is air conditioned throughout and indirectly illuminated.

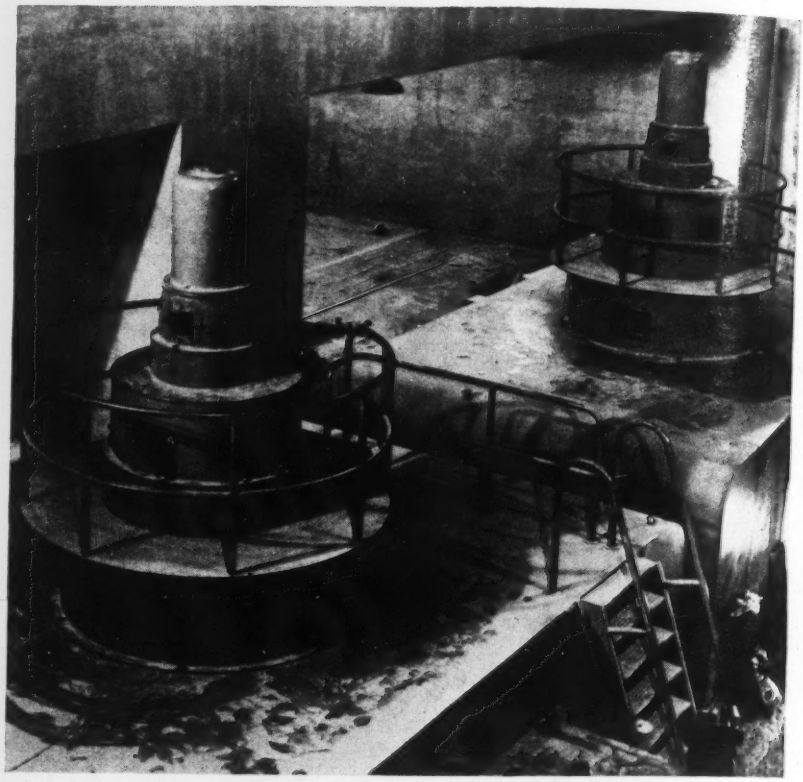
Power at Grand Coulee to be turned on this week

With the installation of two 10,000-kw. station service generators, power at Grand Coulee Dam will be turned on Mar. 22 which, according to John C. Page, commissioner of the U. S. Bureau of Reclamation, will be two years ahead of schedule. The generators will be cut into the Bonneville transmission line to meet normal and defense needs of the Pacific Northwest.

The generated power will be sufficient to supply the needs of a city of 60,000 persons. In the same power house three generators are now being installed in pits five stories deep, one to be completed in August, another in November, and a third in the early months of 1942. Each of these generators will have a capacity of 108,000 kw., topping the 82,500-kw. generators of Boulder Dam, which are said to be the largest anywhere in the world yet completed.

Rush work on the first of these units is shown on the front cover.

Grand Coulee Dam is 550 ft. high, 4,350 ft. long, and contains 11,250,000 cu.yd. of concrete. The first contract connected directly with construction of the dam was let in December, 1933, after President Roosevelt had approved the first allotment of $15,000,000 of public works funds to the Bureau of Reclamation for this project.



Tucked away in a corner of the great power house at Grand Coulee Dam, these two 10,000 kw. generators have been put into service for initial use until the huge 150,000 hp. turbine, the first of three of the same size to be installed, is ready in August.

Act to extend Baltimore's water system

A $20,000,000 enabling act through which Baltimore, Md. may extend its water-supply system and acquire in four adjoining counties additional reservoir capacity has been placed before the State Senate.

The bill provides that the $20,000,000 authorization proposal may be "submitted and resubmitted" to the voters of Baltimore who must ratify the issuance of the bonds. The proceeds of the bond issue would be for "extending, enlarging, developing and improving the municipal water supply and water system, including the construction, reconstruction and extension of transmission conduits, increasing of the source or sources of supply . . ."

A companion bill would empower Baltimore to create reservoirs in the valley of the Patapsco river in Baltimore, Carroll and Howard counties, and in the valley of the Little Gunpowder River in Baltimore and Howard counties. "If the extension of the water system should require that any state road or bridge be damaged or destroyed, joint condemnation proceedings could be instituted by the city and the State Roads Commission."

Engineers, after careful study, recently recommended that steps be taken to extend the city's water supply system as a necessary protection for the future.

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Arkansas refinances its highway bonds

Arkansas has refunded the state highway debt with a saving in interest payments estimated by the refunding board at several million, having sold the RFC its entire refunding bond issue of $136,330,557.29, dated to mature over a thirty-year period.

Competition among financing companies for the bonds was eliminated when the RFC offered to take "all or none" of the bonds at interest rates ranging from 3 to 3.25 percent. The present rates range from 3 to 5 percent.

The refunding operation was made possible by a refinancing act passed by the state legislature early this year and recently validated by the State Supreme Court. A special election was held Feb. 8 at which the proposed financing was approved by the people. The enabling legislation provides that not less than $10,250,000 of highway revenues be set aside annually for highway maintenance and debt service.

Bids on Panama Canal work due next month

Bids for excavation work involving the removal of approximately 30,000,000 cu.yd. of material on the Pacific side of the Panama Canal for the Third Locks project will be called April 17, according to an announcement just issued by Col. Thomas B. Larkin, supervising engineer.

Specifications call for excavation of 12,342,000 cu.yd. of soft material or overburden, and approximately 15,602,000 cu.yd. of rock.

Work is expected to get under way by mid-year.

The government shall have 60 days within which to accept a bid, and the contractor will be required to begin work within 30 days after notice to proceed has been given.

The Pacific side dry excavation project far overshadows that on the Atlantic side in magnitude (contract for this work let Dec. 4, 1940, see *ENR* Feb. 6, 1941, p. 200), since three major jobs are involved; excavation for the new Miraflores Locks, Pedro Miguel Locks, the north approach channel to the latter and the grading and filling necessary for a railway and highway on the west side of the canal.

Materials specifications advanced by A.S.T.M.

Steel specifications out to letter ballot of members and new tests offered for concrete and aggregate

Indication of unusual activity in materials standardization and research was shown during the annual committee week of the American Society for Testing Materials in Washington, D. C., March 3-7, when more than 1,000 material engineers and testing experts met to consider specification matters. Out of the 200 meetings held came a number of developments of particular interest to the civil engineering field.

Committee A-1 on steel approved several new specifications for reference to letter ballot of its members. One of these for low-alloy structural steel covers material, ⅞ to 2 in. thick, with a composition conducive to welding. Maximum carbon is 0.20 per cent and manganese 1.0 per cent. Tensile strengths required range from 63,000 to 70,000 lb. per sq.in. Many of these types of steel have come on the market in recent years. Another development was agreement on recommendations covering weldability of structural steel, relating particularly to limits for carbon and manganese. The recommendations are to be referred to various parties for study and comment anticipating that sometime within the coming year specific action of the society may be requested.

Committee C-9 on concrete and concrete aggregates offered four new tests and specifications to the society as tentative standards. They cover sampling of wet concrete, methods of determining volume of air entrained in concrete, standardized procedures for determining the thickness of cores drilled from a concrete structure and a new specification covering ready-mixed concrete.

Committee C-7 on lime approved an investigation of hydrated limes looking toward a revision of the standard specifications for hydrated lime for structural purposes, particularly with respect to maximum limits on the unhydrated oxides of calcium and magnesium.

Committee C-5 on fire tests of materials and construction voted to send to letter ballot a new method for testing wood chemically treated by impregnation to reduce flammability. Another development was the recommendation that the methods of fire tests of door assemblies be adopted as a full standard. In taking this action, however, the committee indicated its desire to continue studies relating to the escape of smoke.

Committee C-15 on manufactured masonry units accepted for submission to letter ballot a new specification for filter block of vitrified clay and shale as used in sewage and water purification plants.

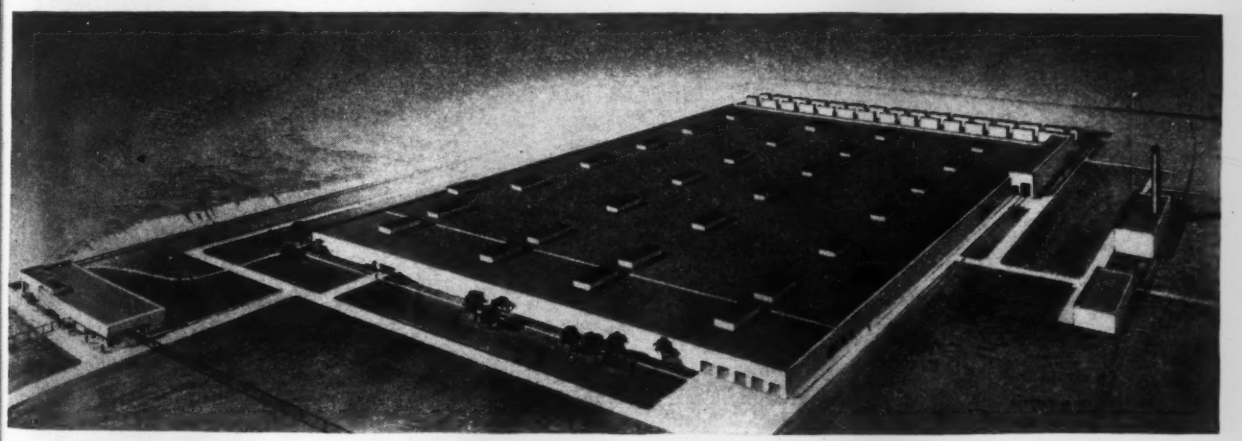
Georgia Senate bars collection of union fees

A bill to prohibit labor unions from collecting fees from workers on federal emergency defense projects in Georgia was recently passed by the senate of the state legislature.

Senator H. B. Edwards, the author, pleaded for the measure on grounds that labor leaders were "racketeering" and "profiteering" on the national defense program by charging workers "excessive fees" to obtain union membership and to secure "the right to work on construction projects."

As originally drafted, the bill would have outlawed collection of union fees on any project financed in whole or in part by tax money. The Senate, however, adopted an amendment offered by Senator Edwards making the measure applicable "only to emergency federal projects financed by federal tax money." The word "emergency" was not defined in the act.

The measure, which has yet to be acted on by the House, would make violation a felony subject to imprisonment for from one to three years. Violation, however, might be treated as a misdemeanor on recommendation of the trial jury. Another provision would give the state commissioner of labor the right to inspect and copy union books and records at any time.



Studebaker adopts blackout design for its airplane engine plants

Latest automobile manufacturer to assume a national defense role is the Studebaker Corp., which has signed up to manufacture Wright airplane engines in three new plants, of which the largest is the 900,000 sq. ft. main manufacturing and assembly plant at South Bend, Ind., pictured here in an architect's sketch. A 240,000 sq. ft. plant at Fort Wayne and a 600,000 sq. ft. plant at Chicago will manufacture engine parts. All three plants follow the same blackout design pattern, which was developed by Giffels & Vallet, Inc. and L. Rossetti, Associated Engineers and Architects, of Detroit. Construction at all three sites is under way.

The South Bend plant, pictured above, is 1,140 ft. long and 760 ft. wide. One story (25 ft.) high, the plant is of the windowless wall type, completely air conditioned and artificially lighted. Fan rooms of the air conditioning system are on the roof, as shown in the illustration.

The chimneys in the background are the air intakes and exhausts for the 30 engine testing cells. Bays of the steel framing are 40 x 40 ft., and the manufacturing floor has a clearance of 18 ft. to the bottom chords of the roof trusses. There is no basement, but electric substations and piping tunnels are located below the floor. In accordance with the usual War Department "directive" that "consideration shall be given to the possibility of aerial bombardment", the designers have provided four stair entrances inside the building that can be used to connect through future tunnels to underground bomb-proof shelters located some distance outside the building walls. Present construction will consist only of the wall of the stair wells.

Photo by PBA

Housing at Westover Field going up on record schedule

Here is a bird's-eye view of defense housing construction at U. S. Army's Westover Field airbase, Chicopee, Mass. Being erected by PBA, the project includes 200-units, grouped in 64 houses, and this is a photographic record of 16 days work — from preparing foundations to erection of frames.

Under the supervision of PBA engineers, the contractor, Casper Ranger Construction Co. of Holyoke, Mass., reports that foundations for the 200 units are complete, plumbing to first floor ready on 114 units; roof framing complete on 105 units, and 17 units have outside trim and window frames.

The project is being built to house married enlisted personnel of the Army.

Court approves hiring of Purcell by San Francisco

Employment of C. H. Purcell, state highway engineer of California, by the City of San Francisco to conduct a five-year study of the city's traffic and transit problems, moved forward another step last week when the state supreme court ruled favorably on the legality of the proposed contract. The decision provided the answer to a friendly suit filed a year ago by City Controller Boyd to test the legality of obligating the city for a five-year period and using various municipal funds for this purpose. As proposed, the contract would involve a $20,000 annual payment to Mr. Purcell, together with additional costs for assistants and office space.

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Photographic record for foundation test holes

Engineers of the Willamette Valley basic flood control project, near Eugene, Ore., have adopted a new method of establishing accurate records of drill test holes by use of photography.

Pictures are now being made of every foot of earth tissue in the 80-ft. deep drill test holes on the project. According to B. E. Torpen, engineer in charge, this method gives a clearer idea of the earth's structural condition than by studying diamond-drill cores, at the same time providing a permanent record for detail study.

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Housing at Fort Dix 90 percent complete

Construction of housing facilities at Fort Dix, located about 30 mi. southeast of Trenton, N. J., for 32,000 enlisted men is approximately 90 percent complete, according to Lieut.-Col. Oliver F. W. Cromwell, acting construction quartermaster.

As stated by Lieut-Col. Cromwell, all of the 1,312 buildings included in six large contracts totaling nearly $14,000,000 will be completed about April 15, but a new road system, retarded by winter weather, may not be completed before late June.

The War Department has requested an additional $4,000,000, but the type and number of buildings to be constructed with this extra money has not yet been determined.

First formal priorities on structural steel

Formal priority ratings went into effect last week on orders for structural steel needed by manufacturers of large cranes. Manufacturers were authorized to apply ratings of A-1-c to any orders they give for steel bars, plates, shapes, castings and forgings. To date, steel suppliers have been expected to give preference to defense orders in an informal way, but there have been no actual priority ratings applied.

The orders from the crane people are likely to be comparatively small, but the present move will prove only the opening wedge for general application of priorities—perhaps within a matter of days. Otherwise an impossible situation would be created. Thus steel needed for, say, a plant to manufacture machine guns now carries no priority rating, but its defense importance is equivalent to a rating of about A-1-b, higher than that of the crane manufacturer. However, as long as the crane order has the only mandatory priority extant it would have to be given preference.

For non-defense steel users this development will mean even greater difficulty in obtaining deliveries than that now being experienced (*ENR*, Feb. 20, p. 301). Especially affected will be those marginal cases of construction projects definitely connected with defense but which might have difficulty obtaining a formal priority rating—such projects, for instance, as hydro-electric plants. Some of these have already run into just this difficulty in obtaining heavy steel forgings, which are now subject to priority control.

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Capital water supply guarded against sabotage

Funds to protect the District of Columbia's water supply system against sabotage were included in a $758,707 supplementary and deficiency appropriation carried in the first deficiency bill reported to the House.

A sum of $158,190 will be used in three ways to protect the Capital's water supply. The guard force which patrols Washington's aqueducts will be increased from 18 to 34. Fences to protect the water intake at Great Falls, reservoirs, filtration plants and auxiliary works will cost $65,000, while $75,000 is to be spent at the Dalecarlia reservoir so that water may be pumped out of the Chesapeake and Ohio Canal in the event of damage to the conduits.

Other items in the bill provide for $560,000 for facilities within rapidly expanding sections of the city. Sewer main extensions will cost $160,000 and surfacing new streets $250,000.

Naval works program of $144,000,000 planned for next fiscal year

House appropriation committee approves projects to provide expanded ground facilities for naval airforce of 10,000 planes

New naval public works projects totalling $144,000,000 are provided for in the Navy Department appropriation for the year ending June 30, 1942, which was reported out by the House appropriations committee last week. Of this sum, $75,600,000 is for expansion of naval aviation facilities. This is the first step in a program, estimated ultimately to cost $278,000,000, to expand ground facilities to care for a naval airforce of 10,000 planes instead of the 3,000-plane force for which present programs are designed. This includes no provision for the new Atlantic bases, for which $58,000,000 has been provided to date in other bills.

Large projects in the newest airbase program include work at Jacksonville, Fla., costing about $10,000,000; at Kodiak, Alaska, $6,200,000; Sitka, Alaska, $5,700,000.

The bill's public works money provides also for ship building and repair facilities costing $11,860,000; storage facilities costing $16,103,000; and for fleet facilities costing $10,800,000.

Structures for housing naval personnel, for which the bill provides $9,276,000, are subjected to cost limits ranging from $10,000 per man for permanent officers' quarters to $3,500 for temporary housing for enlisted men.

The Lanham Act, providing an additional $150,000,000 for defense housing, passed the House last week with an amendment, aimed at such "frills" as electric iceboxes and stoves, requiring that "no movable equipment shall be installed . . . unless the administrator shall deem such installation to be in the public interest." The exception is intended to cover cases where the rent can be raised to cover the increased costs and, perhaps, cases where competition for labor compels offer of attractive conditions.

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Merit system for Ind. road engineers

The Indiana Senate on Mar. 8 approved a House bill setting up a merit system for 375 registered engineers now employed by the highway commission, the board of health and the conservation department.

Earlier in the session both houses unanimously passed a bill transferring $300,000 from one highway department fund to another to allow a 15 percent pay raise for the highway engineers. (*ENR*, Feb. 20, 1941, p. 297.)

The merit system bill provides that whenever any change is made in the employment status or rating of an engineer he may appeal to the Board of Registration for Professional Engineers. The decision of the board is binding on both parties unless an appeal is taken to the Marion County Superior or Circuit Courts. Senator Clyde A. Black declared that the bill would give security to the registered engineer.

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New generator increases power at Wheeler Dam

A fourth generating unit of 32,400-kw. capacity was placed in operation at Wheeler Dam, in north Alabama, Mar. 13, bringing the total installed capacity at this project to 129,600 kw. as announced by the TVA. The new unit brings the total installed capacity of the TVA system to 1,049,600 kw.

The initial installation at Wheeler Dam when completed in 1936 consisted of two units; a third unit was placed in operation in Jan. of this year, and space has been provided at the project for an ultimate installation of eight units.

• • •

Bond issue of $4,250,000 voted by Fort Worth, Tex.

The city of Fort Worth and Tarrant County on Mar. 4 voted for six bond issues aggregating $4,250,000 for national defense projects and general municipal improvements. The money from the sale of bonds will be divided as follows: county road improvements to bomber plant site, $1,250,000; purchase of site for bomber plant, $1,250,000; street improvement, $1,112,000; sanitary sewer and sewage disposal plant, $185,000; new incinerators, $320,000, and municipal garage and repair shop, $160,000.

New York engineers study aerial bombardment protection

Sponsored by the United States Office of Education, a course in aerial bombardment protection is being given this semester by the college of engineering at New York University. Not only does the subject matter differ from that treated by most engineering schools, but the students themselves are in decided contrast to most university engineering classes. The class, shown above, consists of 60 engineers representing several consulting firms, the U. S. Engineers, Navy's Bureau of Yards and Docks, several public utility firms, an eastern railroad, at least two life insurance companies, and numerous departments of the city of New York.

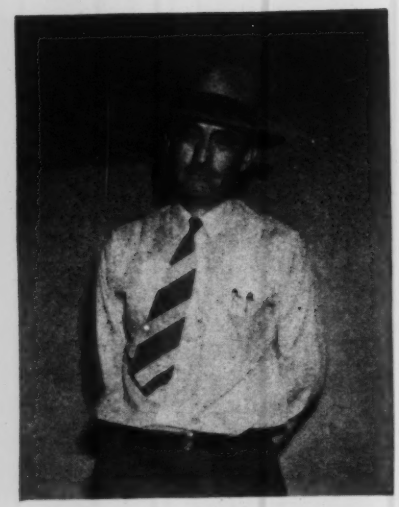
Classes began February 1 and will continue until the middle of May. The weekly three-hour sessions are given over to effects of aerial bombardment; effectiveness of structural materials in resisting bombardment; design and construction of bomb-resistant structures for industry, commerce, and housing; strengthening of existing structures and air raid shelters.

Prof. Harold E. Wessman (extreme right), chairman of the department of civil engineering, is in charge. He is assisted by Prof. Wm. A. Rose (seventh from right in standing row), assistant professor structural engineering. Many outside speakers are lecturing on special phases of the problem.

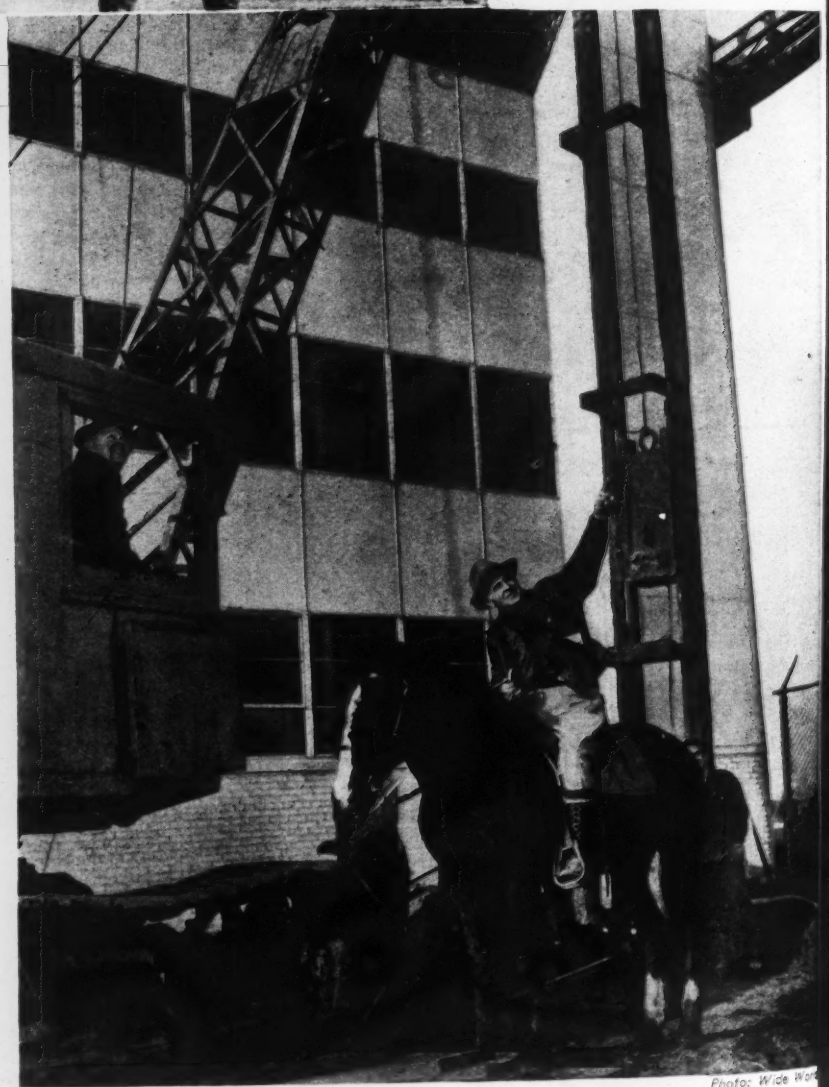
At left: Assist. Supt. McMANN *and Supt. C. F.* WELLS *(right) relax after finishing one of the largest timber roof jobs in the country on the recently completed high school gymnasium at Phoenix, Arizona, which is illustrated in this issue.*

Below: H. W. COLLISON, *construction foreman for The Austin Co., astride his black charger at the mammoth Boeing Airplane Co. project, Seattle, Wash., which covers 42 acres. The black steed enables Collison to cover the area in one-half hour, which formerly took two hours. "Tired feet and worn-out shoe leather" says H. W. "are now passe".*

MEN at WORK



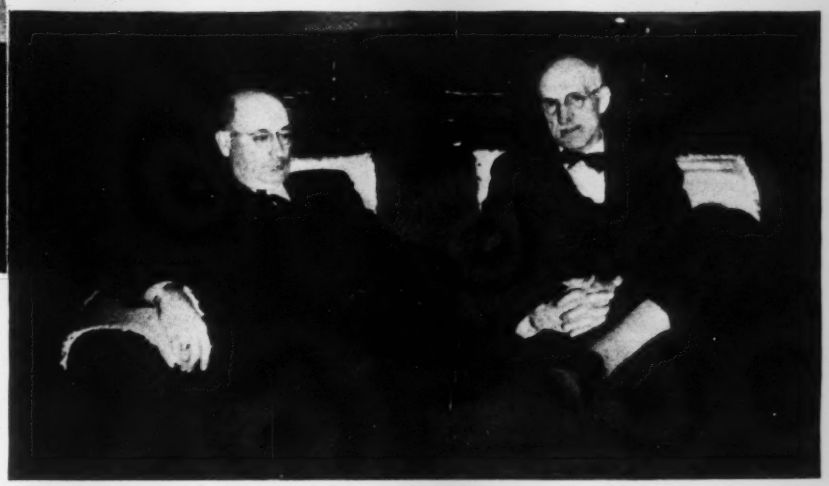
ARTHUR S. HORNER, prominent Denver contractor, was found on the big underpass job in Denver where he is building a subway under six main-line tracks of the Union Pacific Ry. The nonchalant attitude in this picture comes from the fact that he has just learned he was the successful bidder on an $8,000 job. "What the hell," he said, "while $8,000 isn't much, it shows at least we can get a job now and then."



Photos: Wide World

Right: It's funny how these boys from the South do get around! Take **NED WILLIAMS**, *for instance, who in 1922 had just received his civil engineering degree from Clemson College, Clemson, S. C., and today he is assistant bridge engineer of the Wyoming State Highway Department.*

Above: RICHARD E. OSTLAND, job manager for Warner Construction Co., is the fellow that keeps the boys happy on the Green Mountain Dam project in Colorado. One of his many jobs is signing pay checks every two weeks. We ask you, is there any other explanation necessary for his popularity?



Above: It may be a hotel lobby but it's also the office of W. H. SHELLEY (left), of Midland, Texas, and C. N. FLAGG, of Meridan, Conn. Shelley was in charge of construction of a 6-in. diameter "finished product" pipeline from Fall River to Waltham, Mass. for the Shell Pipe Line Corp. The C. N. Flagg Co. holds the contract for laying and welding 59-mi. of 1,000 lb. maximum pressure line, designed to handle 10,000 bbl. daily of gasoline, fuel oil, or similar fluids.

bove: On the broad shoulders of R. J. TEMPLETON rests the esponsibility of spending $1,000,000 yearly to keep yoming's 4,000 mi. highway system in condition. As maintenance engineer, one of his major problems this winter has een snow removal, and that says R. J. "is a real problem when ou consider that many roads are 8,835 ft. above sea level. e has been with the Wyoming State Highway Department r the past 20 yrs.

Below: Forming 24,000 sq.ft. of floor area in an average of less than a calendar week for each of seven floors was the job of J. KONCELIK, general carpenter foreman, and A. JOHNSON, his assistant for Industrial Engineering Co., concrete subcontractor on Rockcliffe Apartments, Montclair, N. J.

Interest at A.R.E.A. annual meeting centers in rail and impact studies

New activities in the rail and track-stress studies and starting of bridge impact research reported at annual meeting of the American Railway Engineering Association.

Expanding activities in research into the problems of railway maintenance engineers were reported at the 42nd annual meeting of the American Railway Engineering Association held in Chicago March 11-13. During the year the A.R.E.A. and the Association of American Railroads, of which the A.R.E.A. is the engineering division, spent $60,000 on research into the cause and prevention of rail fissure, stresses in track, joint bars and bolts, and bridge impact. To this the rail manufacturers added $22,500 for the rail fissure investigations. A notable event in the research work of the association was the resignation of Arthur N. Talbot, professor emeritus in civil engineering at the University of Illinois, from chairmanship of the association's special committee on stresses in railroad track. Dr. Talbot has headed this work for 27 years. The committee is to be disbanded, its work being assigned to the track committee under the supervision of a new committee of the board on research administration.

A special tribute was paid to Dr. Talbot following the presentation of the final report of his committee, and it was announced that the association planned to establish some permanent tribute to him at the University of Illinois.

The president's report on association activities was made by acting president F. L. C. Bond, George S. Fanning, president, having died Jan. 2. In announcing the plan to set up a committee on research administration, Mr. Bond said that this was being done in order that all research might clear through the office of the research engineer assigned to the association by the Association of American Railroads. This committee will initiate arrangements with universities and others for cooperative investigations.

W. S. Lacher, secretary, reported a membership of 1,882 as of March 1, which includes 27 junior members. This new grade was created last year in an effort to enlist the interest of young men in railway service in association activities. During the year the association set up a committee on cooperative relations with universites with the dual purpose of stimulating interest in railway engineering among students and of placing before railway managers the desirability of employing graduate engineers for railway work.

Appropriation of $115,000 by the Association of American Railroads for further study of the effect of locomotive counterbalancing on track was reported to the convention by Charles H. Buford, vice president of the A.A.R., in opening his talk on the railroad's relation to the defense effort. Mr. Buford told of the system for preventing delays in unloading cars that had been developed to prevent repetition of what happened in 1918 when cars used to store military supplies that could not be unloaded crippled the railroads. At the construction projects now under way cars are being unloaded in about a day and a half on the average.

New A. R. E. A. president

F. L. C. Bond, vice president and general manager of the Central Region, Canadian National Railways, Toronto, Ont., was elected president of the American Railway Engineering Association at its annual meeting in Chicago March 11-13.

Railway economics

Mr. Buford's theme was amplified by the committee on economics of railway location and operation in its report on more intensive use of railway facilities. The same committee, in reporting on the effect of higher speeds, pointed out that an increase in speed from 40 to 60 mph. materially cuts down the tonnage that can be hauled and so calls for an increase in the number of locomotives and trains that is out of proportion to the increase in speed. Both fuel and water consumption also are greatly increased.

Increasing use of "off-track" equipment for railway maintenance work was reported by the committee on railway labor. Much equipment that formerly was mounted for movement by rail is now mounted on pneumatic tires for movement over highways or on crawlers for movement along the right-of-way. This cuts down delays to trains, interruptions to the maintenance work to clear trains, and eliminates the employment of work-train crews. The committee reported increasing use of mechanized equipment.

Wood preservation

Progress on a number of cooperative exposure tests on timber piles and test boards in seawater at Panama, San Francisco, New York and at New England points was reported by the committee on wood preservation. The same committee brought up to date its extensive records of the service of treated ties on railroad track.

Speaking of termite attacks, Hermann von Schrenk, consulting timber engineer, St. Louis, said that he is not an alarmist, but that despite precautionary measures, termite attacks are increasing rather than decreasing. He noted the very thorough work being done to protect timber structures at the new military camps by the use of metal shields and added that where there are reports that shields have been ineffective it will be found that they were not made tight at the joints by soldering.

A valuable analysis of the principal runoff formulas was presented by the roadway committee for use in determining the size of culvert openings. In concluding its analysis the committee cautioned against placing too much faith in any runoff formula and urged that the size of culvert openings be determined from actual records wherever possible.

A brief report on the use of asphalt in ballast to keep moisture out of the subgrade was submitted by the roadway committee. A test installation made on the B. & O. Ry. at Bryan, Ohio, in October, 1939, required some replacement of the seal coat this year. No heaving of the track so protected occurred this year, although unprotected track at each end did heave.

No solution for the problem of rapid corrosion of rails and fastenings in tunnels has been found by the track committee after a long study made in Moffat Tunnel. The only way in which corrosion can be checked is by a change to diesel or electric operation. During the discussion of this subject, the fact was

brought out that new ventilating fans were installed in Moffat Tunnel about a month ago. They move the air twice as fast as the old ones and dry the rail and track much more quickly, but little reduction in the rate of corrosion is anticipated.

Larger ties proposed

Of major importance to railway maintenance officers is the proposal put forward by the committee on ties for an increase in the length from 8 to 9 ft. Next year the committee will recommend this increase for approval as standard practice of the association if no strong opposition develops, but notes that the practice must be widely adopted for all tie renewals if the producers are to be relieved of the necessity for carrying two lengths of ties in stock. Longer ties have been under consideration for some time as a means for getting better support for the track. Because the center section of a tie is not tamped to avoid center binding, adding six inches to the length of tie outside the rail adds one foot to the tamped area under each rail.

Terminals for truck business

Another significant report was that of the committee on yards and terminals relating to terminal facilities required for handling highway trucks and trailers on and off railroad cars. In presenting the report, the subcommittee chairman, H. L. Ripley, said that it marks a new venture on the part of the railroads, "an attempt to get back on the rails business lost to rubber." He said that a few railroads had undertaken to provide truck operators with a means for reducing their long distance hauling costs and had met with some success. The terminals have to be located close to industrial centers and must be provided with ample parking areas and special lighting in addition to the loading ramps.

Track stress studies

A new defect that has been found in 112-lb. rails, namely, longitudinal cracks in the outside of the web, was studied during the year by the track-stress committee, but no satisfactory explanation was discovered. The cracking appears to be caused by eccentric loading. In rails where the wheel track is off the center of the rail head vertical bending in the web was found, with resulting high compressive stress in the inner face of the web and high tensile or compressive stresses in the outer web; but these stresses were not high enough nor of such frequent repetition as to cause fatigue of the metal. The committee recommended fuller study, including the fatigue resisting quality of rail steel as found in the web.

Rail studies

In reporting on progress in the cooperative studies of rail manufacture Prof. H. F. Moore, head of the research group, said that the manufacturers have agreed to putting into effect an improved method for controlled cooling of rails based on the committee's study of the methods in use last year.

Prof. Moore also stated that defense work had put a check on his long search for a bend test to substitute for the current drop test of rail steel, because the big hydraulic press of the Bethlehem Steel Co. that was to be used in new studies is no longer available.

Bridge specifications

Revisions of the A.R.E.A. specifications for iron and steel bridges submitted for approval of the association consisted chiefly of new sections relating to stiffeners at the point of bearing, to the fit of stiffeners, and to the preparation of rivet holes. New instructions for the maintenance inspection of steel bridges also were approved for publication in the manual.

Impact studies

Field studies of impact on railway bridges, under consideration for several years past, got under way in 1940 with an analysis of stresses and the measurement of deflections of two plate-girder spans on the main line of the Pennsylvania R.R. at Chester, Pa., one 55 ft. 10 in. long and one 122 ft. long. Stresses, vertical deflections and lateral deflections were measured at speeds ranging from 5 to 105 m.p.h. for two types of electric locomotives, from 5 to 80 m.p.h. for a freight type steam locomotive, and to 90 m.p.h. for a passenger type steam locomotive. The committee found no marked reduction in impact with the electric locomotives, even though they had no unbalanced weight, but observed that the steam locomotives were remarkably well counter-balanced. A definite increase in stress due to speed and termed "speed effect" was found which was distinct from the vibrations that were developed by the moving load. Also found were vibrations induced by the electric locomotives, even though there was no periodic disturbing force set up by unbalanced counterweights. This impact was termed "track effect" and is presumably due to irregularities in the track surface or wheel treads, to the periodic effect of wheels coming on or off the span, or to other conditions of track or locomotive that tend to produce a vertical vibration in the spring-borne weight of the locomotive. This effect seemed to increase rather rapidly up to 30 to 40 m.p.h., particularly on the short span. This evidence of a critical speed, the committee said, may indicate a change in the association's rating rules, but it noted the need for a wider range of studies before definite conclusions could be reached. The committee stated that with the possible exception of the speed effect and lateral forces, the impact allowances in A.R.E.A. specifications are ample. The complete report of this committee is given in A.R.E.A. Bulletin 422.

Column specifications

New specifications for composite columns and for pipe columns were submitted by the masonry committee. They are the outgrowth of the extensive col-

(*Continued on page* 11)

Concrete shell roof over largest ice arena

A clear span of 132 ft. and exterior ribs to provide the effect of a barrel vault for a length of 325 ft. are the notable structural features of the Uline Ice Arena recently completed in Washington, D. C. The roof is of the "Z-D Barrel Shell" type. The main structure is 165 by 375 ft. in plan and the arched roof is 62 ft. high above the rink. The concrete arch shell varies in thickness from 3 to 5 in.

M. J. Uline is owner of the arena, Joe Harry Lapish was architect and Roberts & Schaefer Co., consulting engineers. Contract was carried out by White Construction Co., Inc., New York; R. L. Bertin, chief engineer.

Phoenix builds a new school gymnasium

Topped by what is reported to be the largest roof of its kind in the West, the Phoenix High School District, Phoenix, Ariz., is completing a $300,000 reinforced concrete high school athletic building. In addition to a gymnasium having a seating capacity for 5,000 spectators, there are eight class rooms in the building.

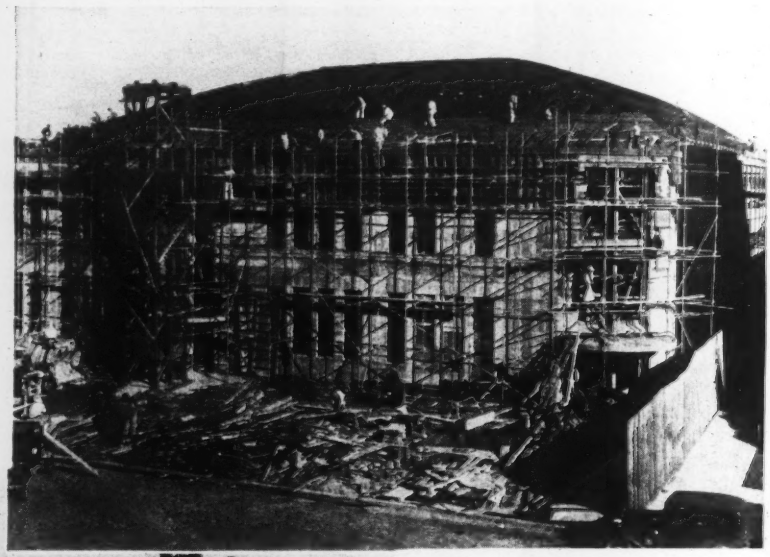
The plan of the building is interesting in view of the location of the entrances to the gymnasium, which are located at the corners, while those to the class rooms have been placed at the ends. This arrangement avoids the use of valuable space in the center of the gymnasium bleachers for the usual stairways. This location of entrances also provides for easy ingress and egress from the class rooms without interference with traffic to and from the gymnasium proper. The spectators' balcony is reached by a ramp.

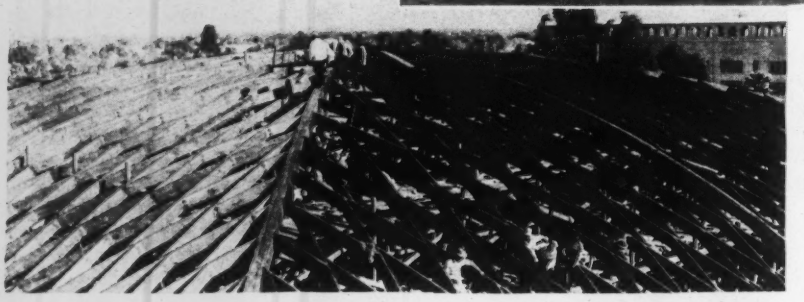
The roof is of the Lamella type (wood members forming a diamond shaped pattern) and has a clear span of 140 ft. in both directions; is hipped at the corners, and the diagonal chord, 190 ft. long, is made up of four laminations of 3 x 14-in. timbers cut to the proper radius.

Glass panels have been substituted in place of wood sheathing on two rows of the diamond pattern ribs along all four sides of the roof, and thus an effective and efficient skylight design has been achieved. The glass panels are equipped with fixtures to take a sufficient number of lamps to provide 60,000 watts of illumination for night use.

Construction is being carried out by WPA for the Phoenix High School District. The architects are Lescher & Mahoney, and J. B. Matz is the Lamella roof sub-contractor.

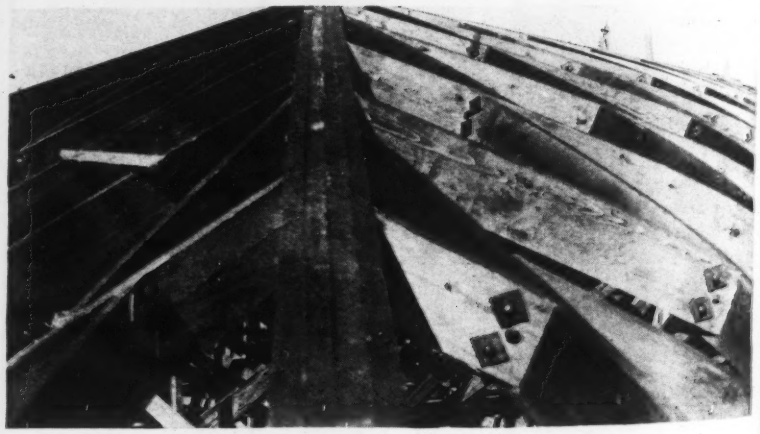
Photos by McCulloch Bros.





Reinforced concrete high school athletic building being completed at Phoenix, Ariz. Entrances to the gymnasium are located at the four corners of the building to avoid loss of valuable space in the centers of the balconies.

Lamella roof providing the well known "fishnet" design in timber, has a clear span of 140 ft. in both directions.



Detail showing construction of the 190 ft. long diagonal roof chord formed by four laminations of 3 x 14-in. timbers.

Defense plant expansion may reach $1,500,000,000

For continuation of the program of ernment defense plant construction, least a billion and a half is now ding. The $7,000,000,000 appropria- to implement the lend-lease bill tains $750,000,000 for new plants, in addition, an equal sum has al- dy been budgeted but not yet included any appropriation bill. On an aver- a little less than half of plant ex- sion money goes into construction. reparing for this step-up in govern- t plant construction, the War De- tment has reorganized its plant site ction board, which now has the duty determining relative priorities as be- en plants as well as the sites to be d. The House last week passed a sure which would have set up a joint gressional committee to oversee plant , but this was killed in the Sen-

ndustrial plant construction for de- e purposes now includes 784 plants ing $2,138,000,000. This is a conserv- e figure since it includes only those he financing of which the U. S. or ish government has had a hand or which permission for five-year tax rtization has been obtained. Included 302 plants which have been govern- t financed, either directly or through RFC to a total of $1,574,000. The ish have financed 61 plants costing ,000,000. And tax amortization privi- s have been granted to 421 plants ing some $393,000,000, with about equal number of applications await- action.

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alrymple-Hay dies; added ood to tunnel shields

ord has been received here of the h in England on Dec. 17 of Sir ley H. Dalrymple-Hay, consulting neer specializing in tunnels, at the of 79. Of his many achievements in el and subway building, none is more ificant than his first—the addition hood to a tunnel shield, by which eliminated the need for either tim- g or a heading outside the shield. oduced in this country by James ie on the Christopher St. tunnels he Hudson & Manhattan Railroad ew York, the hooded shield has standard practice ever since and contributed greatly to safety and ovement in tunneling. Dalrymple- was a young man in 1894 when, esident engineer on the Waterloo City tube railway in London he d a hood to the shield being used. subsequent years Dalrymple-Hay engaged in the design and con- tion of nearly all of the tube rail-ways in London, including Bakerloo, Hampstead and Piccadilly. He was also responsible for the new Piccadilly Circus station which was opened in 1928. As early as 1902 he was consulting engineer of the London Underground Electric Railways Co. In 1907 he commenced practice as a consulting civil engineer. Among his recent important accomplishments is a tunnel in Calcutta, completed in 1931, to carry electric cables under the Hooghly River; this was the first shield-driven iron-lined tunnel under a tidal river in the East, and its construction was carried out under high air pressures and difficult climatic conditions, and with the use of unskilled labor. More recently he had carried out extensions of the London tube railways for the London Passenger Transport Board.

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A.R.E.A. meeting at Chicago, Mar. 11-13

(*Continued from Page* 9)

umn investigations of the American Concrete Institute. The committee also presented an outline of the A.S.T.M. tentative specifications for five types of cement and a discussion of the use of grinding agents or plasticizers to prevent bleeding and to increase the resistance of concrete to frost action. Supplementing this was a discussion of durability of concrete. Specifications for test borings were submitted for discussion, prior to their inclusion in the manual.

Recommended relationships between the energy of a pile hammer and the weight of pile were included in the report of the committee on wood bridges. Similar information submitted last year was withdrawn for amplification following active criticism on the floor of the convention. The new material sets a lower limit on the weight of ram and on speed of driving, to protect against attempts by contractors to make up for inadequate hammer weight by speeding up the rate of driving.

Resigns from rail research work

Arthur N. Talbot, professor emeritus, University of Illinois, resigned on March 12 from his position as chairman of the special committee on stresses in railroad track of the American Railway Engineering Association, thus bringing to a close 27 years of research work for that organization.

New officers

F. L. C. Bond, vice president and general manager of the Central Region, Canadian National Ry., was elected president to succeed the late George S. Fanning. W. F. Cummings, chief engineer, Boston & Maine R.R., was elected vice president, and F. S. Schwinn, assistant chief engineer, Missouri Pacific Ry.; Elmer T. Howson, western editor, *Railway Age;* and B. R. Kulp, chief engineer, Chicago & Northwestern Ry., were elected directors.

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Conn. highways mapped for future planning

Highway Commissioner William J. Cox, of the State of Connecticut, has announced completion of an exhaustive survey of the state's highways, the first since 1893. About 44 maps have been produced covering all rural as well as city areas, and these will be used as a basis for future planning and financing of all road construction undertaken. It is proposed to set up a new unit in the highway department to make use of this information and keep it up to date.

The new maps indicate every significant detail along every mile of roadway, including houses, farms, schools, parks, stores and other business establishments, factories and airfields. The maps will supplement statistical and narrative material covering the entire scope of highway activity.

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Parking lanes for military traffic

West Virginia, with WPA workers, will start construction on a system of parking lanes for motorized military trains along 342 mi. of strategic highways.

Along the roadways half-mile lanes will be built on alternate sides at 2-mi. intervals; they will be 10 ft. wide on knapped stone base 10 in. thick with bituminous surface treatment.

The State of West Virginia will contribute $460,000 and the WPA will supply $1,700,000 of the cost.

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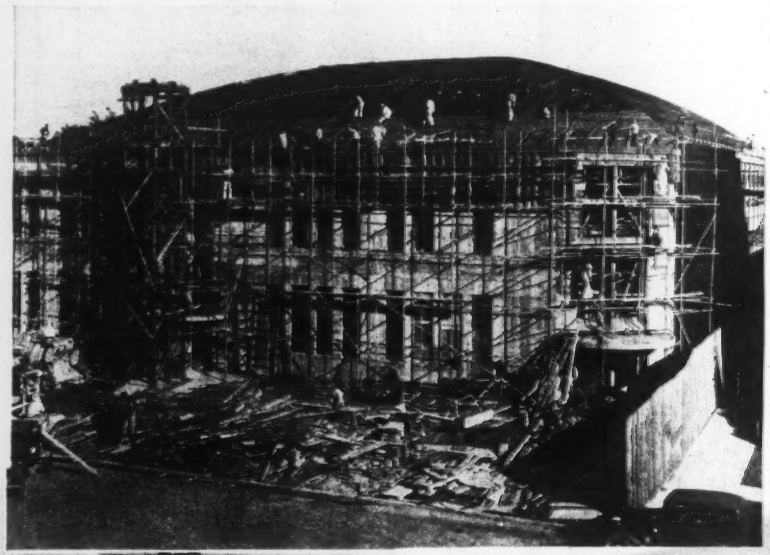

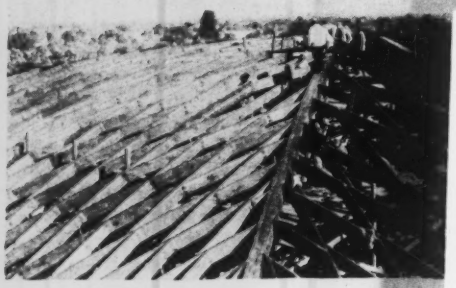

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MEN AND JOBS

M. L. EVANS, who has been architectural engineer for the Central Nebraska Public Power & Irrigation District, with headquarters at Hastings, Nebr., is now acting city engineer for Hastings.

MAURICE KITTERMAN, assistant city engineer for Ottumwa, Iowa, has been promoted to city engineer, to succeed HENRY HUSTON, who recently resigned.

E. W. DUNN, district engineer at Sioux City, Iowa, for the Iowa State Highway Commission, has been granted a leave of absence to become chief engineer for the Decatur Construction Co., on army cantonment work.

L. M. HOSKINS, of Macon, Mo., has succeeded H. M. BRUSH as highway engineer for division No. 2 of the Missouri State Highway Department. Mr. Brush was recently called for army service.

RAY HAUCK has been appointed engineer for Ottumwa County, Kansas, to succeed HOWARD PALMER.

THOMAS ARTHUR JOHNSON of Pensacola, Fla. has been appointed chairman of the Florida State Road Department, succeeding J. W. PERKINS, who recently resigned. Mr. Johnson, for the past three years, has been executive director for the Pensacola Housing Authority. He was at one time chairman of the Intercoastal Waterways Committee of the state, and was instrumental in securing government approval and construction of the canal between Mobile and Pensacola.

J. E. HURTIBISE, civil engineer, is now with the Montreal laboratory for testing materials, at the Ecole Polytechnique, Montreal, Canada.

RAYMOND LEBEL, civil engineer, is now with J. M. Eugene Guay & Co., consulting engineers at Montreal. He is a graduate of the Ecole Polytechnique of Montreal.

A. W. BRIDGEWATER, civil engineer, is now serving as structural designer with the Defense Industries Limited in Montreal, Canada. He holds a master of science degree in civil engineering from the University of Saskatchewan, 1936.

MILTON W. BREIVOGEL, city planning engineer and WPA director at Racine, Wis., has resigned to accept the position of principal city planning engineer of Los Angeles, Calif. Mr. Breivogel is a graduate of the University of Wisconsin, and was formerly senior engineer in the Milwaukee, Wis., planning department.

K. E. BENTLY, civil engineer, is now maintenance engineer with the Imperial Oil Co. at Dartmouth, N. S. He is a graduate in civil engineering from the Nova Scotia Technical College.

RAYMOND BOUCHER, civil engineer, is now associate professor of hydraulics at the Ecole Polytechnique of Montreal. He holds a master of science degree from the Massachusetts Institute of Technology.

J. G. BRADLEY is located at Mackenzie, British Guiana, as maintenance engineer for the Demerara Bauxite Co.

DON JOHNSTONE is now on active duty as lieutenant, junior grade, with the civil engineering corps, U. S. Naval Reserve, at the Bureau of Yards and Docks in Washington, D. C. Lieut. Johnstone was formerly professor of civil engineering at Ohio State University.

W. A. KENNEDY, Philadelphia, Miss., project engineer of the Mississippi State Highway Department, is now serving with the 106th Engineers at Camp Blanding, Fla.

PAUL E. DUBOIS, who has been connected with the engineering department of Oklahoma City, Okla., has been appointed airport engineer of that city.

C. E. ELLERBROOK, of Kansas City, Kan., assistant engineer of Wyandotte County, has been made county engineer. He succeeds LEROY ARNOLD, who resigned to act as civilian engineer on camp construction at Fort Leavenworth, Kan.

CAPT. OCIE V. BLANKENCHIP, U. S. Engineers, located at Gadsden, Ala., has been ordered to active duty at Mobile, Ala.

R. J. DURLEY, civil engineer, secretary emeritus of the Engineering Institute of Canada, has been elected as a member of the council of the Institution of Civil Engineers of Great Britain, and is chairman of the Canadian Advisory Committee of the Institution.

A. T. HURTER, civil engineer, has accepted a position as project engineer with Defense Industries Limited in Montreal, Canada. Mr. Hurter was formerly connected with the Lake Sulphite Pulp Company as engineer in charge of construction.

A. H. COLE, civil engineer, has joined the staff of the Canadian Car & Foundry Co. at Montreal. Since his graduation from McGill University in 1936, he has been with the D. W. Ogilvie & Co. Inc. general contractors of Montreal.

A. W. HOWARD, civil engineer, has been transferred from Calgary to Montreal and is now employed with the Montreal Engineering Co. Ltd. Since his graduation from the University of Toronto in 1935, he had been with the Calgary Power Co., Calgary, Alta.

W. M. PIATT, consulting engineer of Durham, N. C., has been named as a member of the advisory council which will supervise merit examinations to be given all state and county health department employees in North Carolina who participate in the expenditure of federal funds.

W. M. WALLACE II, member of the firm of Kelly, Syska & Hennessy, consulting engineers, Durham, N. C., has been stationed at Wilmington, N. C., in charge of all engineering work in connection with the $5,000,000 shipyard being erected for the North Carolina Shipbuilding Co. LOUIS BOUVIER, draftsman in the Durham office, has been assigned to the Wilmington project.

T. F. HOBART, who has been resident engineer, Birmingham district, of the Birmingham division, Alabama Highway Department, has been appointed assistant division engineer at Birmingham, succeeding A. P. BILLARDSEN, who has been transferred to Grove Hill, Ala.

OLIVER J. SEMMES, JR., city engineer of Pensacola, Fla., for nine years, has been granted a leave of absence to become consulting engineer with Yonge & Hart, architects, and will be on construction work at the Army air corps project at Elgin Field near Valparaiso.

ROBERT REYNOLDS, of Hayti, Mo., has been engaged as city engineer of Blytheville, Ark.

ERIC TAIT, civil engineer, is now with the Shawinigan Engineering Co. at Montreal, Canada. He was graduated in civil engineering from McGill University in 1939.

ELWIN QUINNEY, bridge designer with the South Dakota State Highway Commission, has resigned to accept a position as engineer of the South Dakota Public Utilities Commission. Mr. Quinney fills the vacancy left by John H. Hamilton who was recently called to active military duty.

CLARENCE HELM, a consulting engineer of Hibbing, Minn., has been called to Washington where he will be assigned to duties by the U. S. Engineers.

Ohio Senate votes to guard water supply

The Ohio Senate pushed through a bill, Mar. 10, by unanimous vote, as an emergency measure, to permit sheriff's deputies in one county to patrol public property which also extends through an adjoining county.

The legislation was passed due to threats of sabotage against the huge Mahoning Valley water reservoir which would imperil millions of dollars' worth of national defense contracts in the region's steel mills. The fight for the legislation was carried to the Senate by Senator William Glass of Youngstown. Senator Glass declared, "We have evidence of threats of sabotage"; which if carried out, would result in huge property damage, as well as injury to the health of the people of this section.

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Canada sets up wartime housing authority

A government-owned company, to be known as Wartime Housing, Limited, has been set up by the federal government of Canada, to deal with the serious problems of housing war workers, according to an announcement of the Minister of Munitions, C. D. Howe. A sum of $100,000 will be made available for the initial operation of the company; a limit of ten million dollars has been set as the amount which the company may spend without the authorization of a further order-in-council. It is intended that the company will take "appropriate action" wherever a shortage of housing for war workers in the Dominion becomes apparent.

Joseph M. Pigott, president of Pigott Construction Co. Ltd., of Hamilton, and a leading figure in Canada's construction industry, has been appointed president of the new company.

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Connecticut to widen defense roads

Connecticut's highway commissioner, William J. Cox, has announced a defense program for widening shoulders of strategic roads throughout the state to bring them up to military standards. The program follows a request of the War Department and is estimated to cost $2,230,000.

Under the plans the Connecticut Highway Department will provide $1,100,000 for this work and the government will furnish $1,130,000. Specifications for military traffic calls for 10-ft. shoulder on certain strategic roads. To make Connecticut ready for military convoys 245 mi. of roads must be widened.

JOBS OF THE WEEK

TROOP HOUSING FACILITIES, Fort Jackson, S. C.

J. A. Jones Construction Co., Charlotte, N. C., will build additional troop housing facilities at Fort Jackson. The contract amounting to $3,924,607 was let by the War Department.

HOUSING, Territory of Hawaii

R. E. Woolley, Honolulu, T.H., has received a contract for constructing 342 housing units at Schofield Barracks, 32 units at Fort Kamehameha, and 105 units at Honolulu. Estimated cost is $1,691,000. Public Buildings Administration, Washington, D. C., awarded contracts.

CARTRIDGE CASE FACTORY, Indianapolis, Ind.

Stone & Webster Engineering Corp., Boston, Mass., will build a factory to manufacture cartridge cases for the Bridgeport Brass Co., Bridgeport, Conn. Estimated cost for construction is $5,000,000–$6,000,000. Total cost of plant with equipment $11,500,000.

PLANT, Harrison, N. J.

Walter Kidde Constructors, Inc., has been awarded contract for one and two story, basement, manufacturing building for crankcases for aeroplane engines by Otis Elevator Co. The cost of entire plant, including equipment is $6,955,000.

WAREHOUSES, Conley, Ga.

A. Farnell Blair, Decatur, Ga., was the low bidder for constructing fourteen warehouses and utilities. The contractors bid for buildings with concrete roofs $3,900,000 or with steel roofs $4,271,000. The Construction Quartermaster took bids.

HABOR DEFENSE, Delaware and New Jersey

White Construction Co., Inc., New York and George & Lynch, Inc., Wilmington, Del., were awarded contract for the construction of harbor defense, including heavy concrete construction at Cape Henlopen, and Fort Saulsbury, Del., and Cape May, N. J. The contract let on cost plus fixed fee basis is estimated at $3,500,000. U. S. Engineers, Philadelphia, Pa., let contract.

PLANT, Freeport, Tex.

Dow Chemical Co., Freeport, Tex., has been awarded contract by War Department for construction, machinery and equipment to expand Freeport plant. Estimated cost will be $8,007,407.

AMMUNITION STORAGE DEPOT, Ravenna, Ohio

Hunkin-Conkey Construction Co., Cleveland, O., has been awarded contract for constructing ammunition storage depot at Ravenna Ordnance Plant to cost $4,039,675. War Department awarded contract.

AIRPORT, San Francisco, Calif.

City of San Francisco and San Francisco County, will build runways, for airport at Treasure Island, in San Francisco Bay, by WPA labor. Estimated cost is $1,600,000. C. Healey, Department of Public Works, is engineer.

TEMPORARY HOUSING, Fresno, Calif.

George A. Fuller, Los Angeles, Calif., was lowest bidder on 124 temporary buildings at Fresno Air Base, 3 mi. northeast of Fresno, at $872,855. Bids were opened March 8, by U. S. Engineer, Sacramento.

HOUSING, Philadelphia, Pa.

A. J. Paretta Contracting Co., Long Island City, N. Y., was lowest bidder on Mar. 13, for constructing 500 dwelling units for defense housing project, at $1,671,776. Public Buildings Administration, Washington, D. C., took bids.

NAVAL SUPPLY DEPOT, Bayonne, N. J.

Wigton-Abbott and Mahony-Troast Co., Plainfield, N. J., awarded contract by Yards & Docks, Navy Department, Washington, for constructing a naval supply depot. Estimated cost is $3,000,000.

NAVAL ORDNANCE PLANT, Warren, Mich.

Bryant & Detwiler Co., Detroit, Mich., has been awarded contract for general construction of naval equipment plant, including main building and six other buildings, by Hudson Motor Car Co., Detroit, Mich. Navy Department awarded a previous contract to Hudson Motor Car Co. to build plant, at total cost of $16,000,000.

DRYDOCK, Philadelphia, Pa.

Drydock Associates, New York, N. Y., received the contract for constructing a $8,000,000 to $10,000,000 drydock at the Philadelphia Navy Yard for the Bureau of Yards & Docks, Navy Department, Washington, D. C. Spencer, White & Prentis and Merritt-Chapman & Scott Corp., both of New York, and Foley Bros., Inc., Pleasantville, N. Y., are the companies forming Drydock Associates.

NOTE—Additional bidding and contract news on over 800 projects large and small appear in the Construction News section beginning on page 16.

OBITUARY

SAMUEL C. LANCASTER, pioneer road-builder, and chiefly known for his design and construction of the scenic Columbia River highway in Oregon, died at his home in Portland, Ore. Mar. 4. Mr. Lancaster was 77.

CLAUDE C. HOCKLEY, 62, formerly regional director of PWA at Portland, Ore., died in that city Mar. 4.

EMIL RUDOLPH, one of the last of Chicago's old-time surveyors, died at his home in Lake Forest, Ill. on Mar. 4, at the age of 86.

O. M. FLAHERTY, 73, retired engineer, died Mar. 4 at Richmond, Va. Before his retirement, Mr. Flaherty was with the Chesapeake & Ohio Railroad for 50 years.

HARRY B. REINSAGEN, 68, former assistant chief engineer for the New York Central Railroad, died Mar. 1 in Cleveland, Ohio.

WILLARD S. STAIR, Fort Smith, Ark., 75, a retired bridge builder, died in Little Rock, Ark., Mar. 2.

WILLIAM W. HOWARD, civil engineer, 66, died Feb. 24 at Toledo, Ohio. Mr. Howard was employed by the New York Central system for 42 years.

CHARLES W. SCRANTON, civil engineer, died Feb. 25 at New Haven, Conn. Mr. Scranton was an engineer on the New Haven Railroad for 30 years.

DAVID H. RYAN, well known contractor of San Diego, Calif., died Feb. 18 at the age of 57. Mr. Ryan had executed contracts at Grand Coulee Dam and other important Pacific Northwest projects.

PIERCE P. CONDON, 65, superintendent of streets at Watertown, Mass. for the past 27 years, died at Watertown Mar. 4.

CAPT. WILLIAM H. HYLAN, 66, engineer for many years with the Government engaged in building and improving docks and harbors in Porto Rico, died in Miami, Fla., Mar. 2. He was a native of Waterbury, Conn., and was educated at Yale University.

CHARLES OTIS KEITH, construction engineer, died Mar. 9 at Sarasota, Fla. He was 51 years old.

FRED LINSLEY, 72, retired engineer, died Feb. 26 at Rapatte, Ill.

R. T. WILLINGHAM, civil engineer, was recently killed in a train accident at Gore, Colo.

C. J. Cocke, 67, highway contractor, died Feb. 23 at Marshall, Texas. Mr. Cocke was president of the Amarillo Bridge Co.

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Alabama highway staff hit by call to arms

The Alabama State Highway Department announces that 57 members of its technical staff, and more than 100 of its employees holding subordinate positions, have been called in the armed forces of the U.S., or to national defense industries within the past six months.

Florida court upholds public housing

Low-rent housing and slum clearance have been upheld as a municipal purpose within the limits of the state constitution in a recent decision by the Supreme Court of Florida. At the same time the court approved the granting of tax-exemption to public housing communities in the state.

Previously the Florida court had upheld enabling legislation allowing local housing authorities to participate in the USHA low-rent and slum clearance program. The highest courts of 27 states have now handed down similar decisions.

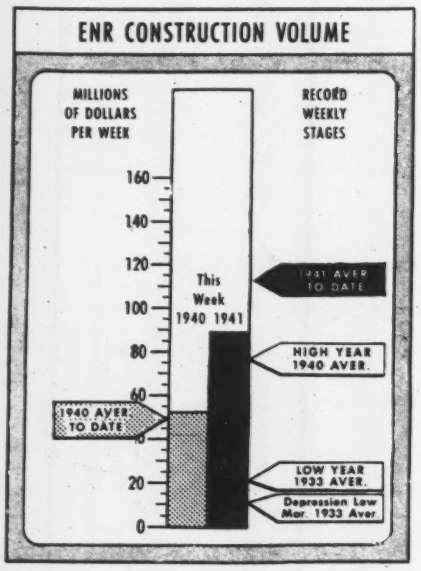
CONTRACTS AND CAPITAL

ENGINEERING CONSTRUCTION awards for the week, $89,558,000, top the total for the corresponding 1940 week by 71 percent, but are 32 percent lower than a week ago. This is the 29th consecutive week in which current totals have exceeded their respective values of a year ago.

The current week's figure brings 1941 construction to $1,346,096,000, a gain of 125 percent over the total reported for the opening 12-week period last year. Private awards are 84 percent above a year ago, and public construction is up 146 percent as a result of the 842 percent increase in federal work.

Private awards for the week are 5 percent higher than a year ago, but are 20 percent below a week ago. Public construction tops last year by 101 percent, but is 35 percent under last week.

In the classified construction groups, gains over the 1940 week are in waterworks, sewerage, commercial and public buildings, earthwork and drainage, and unclassified construction. Increases over last week are in sewerage, bridges, commercial buildings, and earthwork and drainage.



New capital for construction purposes for the week totals $32,704,000, an increase of 230 percent over the total for the corresponding 1940 week. The current week's new financing is made up of $26,465,000 in state and municipal bond sales, $6,159,000 in corporate security issues, and $80,000 in RFC loans for public improvements.

New construction financing for the year to date, $725,968,000, tops the volume for the corresponding 12 weeks in 1940 by 220 percent.

CONTRACTS

(Thousands of dollars)

	Week Ending Mar. 21 1940	Mar. 13 1941	Mar. 20 1941
Federal	$10,755	$84,323	$49,307
State & Municipal	25,579	27,620	23,639
Total public...	$36,334	$111,943	$72,946
Total private..	15,868	20,683	16,612
TOTALS	$52,202	$132,626	$89,558
Cumulative 1941 ....(12 weeks)....			$1,346,096
1940 ....(12 weeks)....			$597,723

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1940 12 weeks	1941 12 weeks
NON-FEDERAL	$226,645	$216,968
Corp. Securities	34,386	63,463
State & Mun.	101,067	114,004
U.S.H.A. loans	90,547	13,521
R.F.C. loans	645	25,980
FEDERAL	.....	$509,000
TOTAL CAPITAL	$226,645	$725,968

FHA MORTGAGES

	Week Ending Mar. 16 1940	Mar. 8 1941	Mar. 15 1941
Selected for appraisal ...	$26,747	$30,561	$ ....*
Cumulative 1941 .....(11 weeks).....			$ .....*
1940 .....(11 weeks).....			$213,172

* Subject to revision.

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost	Mar. '41...250.71		120.72
Building Cost	Mar. '41...207.88		112.36
Volume	Feb. '41...374		164

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

NORFORK DAM ARKANSAS

OWNER: U. S. Engineer Office, Little Rock, Ark.; Major T. F. Kern, dist. engr.

PROJECT: Construction of Norfork Dam, a concrete gravity type dam for flood control, located on North Fork River in Baxter County, Ark., about 4½ miles northeast of Norfork. This contract involves diversion and care of river; clearing, grubbing, excavation and foundation preparation for dam; drilling and pressure grouting including core and percussion drilling, and grouting under dam and abutments; drainage systems, including gallery, stilling basin, roadway and miscellaneous drainage; backfill, protection stone, and gravel surfacing; concrete masonry for complete dam and appurtenant works; furnishing and installing slide gates, pumps, motors, emergency gates and frames, penstocks and supporting frames, conduit linings, tainter gate anchorages, stand-by unit, operating tower crane, gallery truck and chain hoists; passenger elevator; operating tower complete; power and lighting system; and miscellaneous items such as trash rack guides, pipe, handrailing, water supply system, etc.

CONDITIONS: Contractor is required to provide all materials except cement, and complete work within 1,200 calendar days without interference to other contractors engaged on project. Government is providing standard gage railroad for project, also a two-lane gravel-surfaced access road. Wage rates are: skilled labor, $1.00 to $1.50 per hr.; semi-skilled, 40 to 75c.; and common, 30c.

BIDS: Six bids were opened February 20, 1941, ranging from the contract low of $10,778,726 to $12,719,844. Engineer's estimate, $9,413,158.

LIST OF BIDDERS:

1. Utah Constr. Co., Ogden, Utah, and Morrison-Knudsen Co., Inc., Boise, Idaho (contract) $10,778,726
2. United Constr. Co., Porter-DeWitt Constr. Co., and LaCrosse Dredging Corp., Winona, Minn. 11,081,665
3. W. E. Callahan Constr. Co., Dallas, Tex., and Gunther & Shirley Co., Los Angeles 11,726,624
4. S. A. Healy Co., White Plains, N. Y. 12,140,486
5. Brown & Root, Inc., Austin, Tex., and McKenzie Constr. Co., San Antonio, Tex. 12,708,972
6. Dravo Corporation, Pittsburgh, Pa. 12,719,844

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Care and diversion of river	L. S.	$340,000.00	$100,000.00	$400,000.00
2. Common excavation, dam	400,000 c. y.	2.10	2.33	3.00
3. Common excav., approach road	148,000 c. y.	.23	.35	1.00
4. Rock excavation, dam	280,000 c. y.	4.00	3.41	4.00
5. Rock excav., approach rd. and turn-around	11,500 c. y.	1.20	2.43	3.00
6. Rock excavation, trenches	150 c. y.	17.50	29.00	8.00
7. Foundation preparation	5,400 sq.	19.00	16.00	27.00
8. Protect treatment for shale	4 sq.	60.00	15.88	7.00
9. Close line drilling	7,500 s. f.	.90	1.22	1.00
10. Stripping left abutment	L. S.	48,700.00	35,000.00	200,000.00
11. Core drilling, 3-in. holes, 0–80 ft.	13,000 l. f.	2.85	1.50	3.15
12. Core drill., 3-in. holes, 0–40 ft., through pipe	23,000 l. f.	2.50	1.80	2.50
13. Core drill, as above, 40-100 ft.	20,000 l. f.	2.60	1.80	2.70
14. Core drill, as above, 100–150 ft.	1,000 l. f.	2.85	1.81	3.00
15. Core drill., 1¼-in. holes, 0–40 ft., from foundation	20,000 l. f.	2.00	1.40	2.50
16. Core drill., 3-in. holes, 0–100 ft., through pipe	24,000 l. f.	5.10	3.90	5.50
17. Core drill., 8-in. holes, 0–100 ft.	1,000 l. f.	6.60	10.00	7.00
18. Percussion drilling, 3¼-in. holes, 0–10 ft.	12,700 l. f.	.75	1.25	.75
19. Pressure grouting, under 20,000 c. f.	20,000 c. f.	1.70	.70	2.00
20. Pressure grouting, over 20,000 c. f.	40,000 c. f.	.60	.60	.50
21. Uncompacted backfill	9,000 c. y.	.24	.06	.20
22. Compacted backfill	35,000 c. y.	.90	.70	.40
23. Rolled fill	153,000 c. y.	.19	.15	.07
24. Dumped rock backfill	72,000 c. y.	.90	.40	.20
25. Crushed rock	11,000 c. y.	2.35	1.75	1.50
26. Dumped riprap	33,000 c. y.	1.75	.40	.80
27. Rock gutter paving	450 c. y.	10.00	18.00	8.00
28. Gravel surfacing	6,500 c. y.	1.90	1.25	1.00
29. Unload, haul and store cement	1,200,000 bbl.	.15	.06	.09
30. Conc. in baffles and end sill	2,000 c. y.	12.30	14.64	15.00
31. Conc.; rdwy., sidewalks, parapets	3,100 c. y.	19.50	18.85	15.00
32. Conc.; spillway bridge	2,430 c. y.	20.50	23.83	20.00
33. Conc.; trash rack supports	650 c. y.	17.50	20.00	25.00
34. Concrete in piers	6,000 c. y.	10.50	15.26	6.00
35. Conc.; still. basin, training walls	46,000 c. y.	5.60	6.08	7.00
36. Mass concrete in dam	1,410,000 c. y.	3.90	4.34	4.10
37. Concrete in box culvert	670 c. y.	20.00	23.47	25.00
38. Operating tower	L. S.	72,000.00	50,000.00	40,000.00
39. Steel reinforcement	3,600,000 lb.	.05	.06	.045
40. Setting anchors	1,040 ea.	1.00	4.06	2.00
41. 14-in. asbes.-cement pipe and fittings	1,540 l. f.	3.70	7.96	3.80
42. 20-in. asbes.-cement pipe and fittings	3,300 l. f.	4.80	8.27	7.00
43. 24-in. asbes.-cement pipe and fittings	660 l. f.	6.80	10.18	9.00
44. 36-in. asbes.-cement pipe and fittings	100 l. f.	19.50	29.24	10.00
45. 18-in. semi-cir. galv. c. m. pipe drains	2,300 l. f.	3.50	3.77	2.40
46. 24-in. galv. corr. met. pipe	30 l. f.	4.70	7.07	5.00
47. Timber bulkheads	4 ea.	205.00	384.00	100.00
48. Cast iron pipe and fittings	21,000 lb.	.081	.36	.14
49. Flanged c. i. pipe and fittings	325,000 lb.	.088	.12	.14
50. Black steel pipe and fittings	215,000 lb.	.088	.15	.10
51. Galv. steel pipe and fittings	1,700 lb.	.19	.24	.15
52. Cooling pipe and fittings	900,000 l. f.	.165	.12	.15
53. 36-in. gate valves	2 ea.	1,750.00	2,800.00	1,720.00
54. Piezometer piping and fittings	L. S.	2,350.00	5,365.00	3,000.00
55. Float well system	L. S.	1,500.00	2,455.00	1,500.00
56. Handrailing and fittings	11,000 lb.	.32	.35	.20
57. Parapet handrailing	98,000 lb.	.32	.25	.20
58. Roadway guard railing	2,100 l. f.	1.40	1.00	1.00
59. Pumping cooling water	160,000 M gal.	.50	.30	1.00
60. Slide gates and accessories	1,140,000 lb.	.30	.40	.30
61. Bulkhead gates and frames	52,000 lb.	.28	.46	.15
62. Conduit lining	223,000 lb.	.13	.26	.11
63. Penstocks and supporting frames	1,468,000 lb.	.115	.19	.15
64. Trunnion anchorages	L. S.	40,000.00	35,000.00	35,000.00
65. Oil pumps, motors, piping	L. S.	23,200.00	25,000.00	20,000.00
66. Stand-by power unit	L. S.	8,300.00	7,000.00	9,000.00
67. Chain hoists	L. S.	600.00	875.00	450.00
68. Gallery truck	L. S.	420.00	670.00	100.00
69. Operate tower crane and accessories	L. S.	7,700.00	7,000.00	5,000.00
70. Elevator	L. S.	18,000.00	15,000.00	15,000.00
71. Water system	L. S.	10,500.00	10,000.00	7,000.00
72. Plumbing system	L. S.	1,140.00	2,000.00	700.00
73. Automatic sump pumps; piping	L. S.	4,400.00	3,500.00	3,400.00
74. Electr. conduit and fittings	208,000 lb.	.23	.15	.23
75. Power and lighting system	L. S.	52,000.00	35,000.00	45,000.00
76. Misc. structural steel	243,000 lb.	.105	.20	.15
77. Misc. iron castings	42,400 lb.	.16	.23	.20
78. Corrosion-resisting steel	3,000 lb.	1.30	1.80	1.70
79. Semi-corrosion-resisting steel	72,300 lb.	.15	.18	.16
80. Caps for 6-in. drain pipe	324 ea.	9.50	15.00	10.00
81. Safety treads	2,140 l. f.	1.00	2.22	.90
82. Wrought-iron ladder and hand rungs	6,200 lb.	.29	.33	.30
83. Miscellaneous doors	L. S.	1,000.00	7,500.00	4,000.00
84. Copper water stops	83,000 lb.	.65	.60	.65
85. Brass and bronze	1,600 lb.	1.05	2.13	.90
86. Tile gages	250 l. f.	7.50	14.41	4.00
87. Operating tower stairs, above El 580.5	L. S.	2,550.00	4,400.00	1,500.00

The Contract Unit Price Section of the Annual Construction Cost Issue of Engineering News-Record, April 24, 1941, will collate and classify approximately 90 unit bids made by contractors on the various projects begun during the past year.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction
(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges, Grade Cross'gs	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR):
LOW BIDDERS: All low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

WATER SUPPLY

PROPOSED WORK

★**Conn., Waterbury**—Street, Sewer & Water Dpt., 114 Benedict St., preliminary plans water sys. imprvs. and exten. high pressure pipe line and reservoir. $2,000,000.

Minn., Red Wing—Chicago, Milwaukee, St. Paul & Pacific R.R., Union Sta., Chicago, Ill., W. H. Penfield, ch. engr. sys., 50,000 gal. steel water tank.

Minn., St. Louis Park (suburb Minneapolis)—J. Justad, town clk., additional water storage tank.

N. Y., Dunkirk—Bd. Water & Light, City Hall, watermain extens., replacements. Over $15,000. A. G. Walter, city engr.

N. Y., Willard—State Dpt. Mental Hygiene, State Bldg., Albany, bids soon water supply sys., tank, pumps. $36,000. T. F. Farrell, State Bldg., Albany, engr.

★**O., Warren**—Reservoir above Milton reservoir to increase and control flow of water in Mahoning River. $1,000,000 or more.

Pa., Wyomissing—Boro Council, developing spring water supply southwestern part boro, new feeder lines, pump plant, etc. I. Hafer, boro engr.

†**Tenn., Kingston**—Tennessee Valley Auth., Knoxville, water line from Swan Pond to Kingston. $25,000.

Tex., Brownwood—Brown Co. Water Imprvt. Dist. 1, c/o H. Bettis, mgr., increasing water facilities, increasing capacity existing pump. and treating plant from 5,000,000 gal. to 10,000,000 gal. capacity. $135,000.

Tex., Corpus Christi — A. C. McCaughan, mayor, bids soon, expansion WW sys. to Westgate Heights. $22,000 or more. H. T. Cunningham, c/o City, engr.

Tex., Goose Creek—J. H. Meek, mayor, exten. existing WW sys. to provide distr. lines. Voted bonds. $40,000. B. B. Williams, Goose Creek, engr. CD 1/21—ENR 1/23.

Va., Danville—Plans bond election soon, standpipe, North Danville $75,000; street and sewer imprvs. $100,000, imprv. gas service $15,000, electric service $60,000. C. L. Scott, Danville, city engr.

★**Wash., Tacoma**—Replacing watermains in Park Ave. between S. 35 and 96 Sts. $600,000. C. D. Forsbeck, City Hall, engr.

Ont., Brampton—WW sys. imprvs. $20,000.

Ont., Port Lambton—Wynne-Roberts Son & McLean, engrs., 67 Yonge St., Toronto, bids soon installing WW sys. for Sombra Twp., R. E. Bradshaw, clk., Wilkesport. $75,000. CD 2/28—ENR 3/13.

Ont., Portsmouth—R. J. Lacey, clk., 11 Alwington Ave., Kingston, WW sys. imprvs. $20,000.

Ont., Timmins—A. L. Shaw, municipality clk., WW imprvs. and chlorinator plant. $30,000. J. D. MacLean, Town Hall, engr.

Ont., Wilkesport—Sombra Twp., R. E. Bradshaw, clk., WW sys. $35,000. Wynne, Roberts Son & MacLean, 67 Yonge St., Toronto, engrs.

Que., Bourlamague—WW sys. exten. $15,000. B. Pelletier, Div. Mine Villages, Dpt. Mines, Quebec City, engr.

Que., Cadillac—Exten. sys. to supply potable water for domestic use, well boring. $20,000. B. Pelletier, Div. Mine Villages, Dpt. Mines, Quebec City, engr.

Que., Louiseville—R. R. Beland, municipality clk., intake on Maskinonge River above Canadian National R.R. bridge 250 ft. elevation above Town and renewal existing pipe line 7 mi. from Ste. Ursule Springs. $100,000.

Que., Pascalis—Well boring to provide underground supply of potable water for domestic uses. $20,000. B. Pelletier, Div. Mine Villages, Dpt. Mines, Quebec City, engr.

BIDS ASKED

Bids Asked March 26

†**Md., Hyattsville** — Washington Suburban Sanitary Comn., Owens Ave., c.i. watermain, Contr. 116-W; adv. ENR 3/20.

Bids Asked March 27

N. Y., York—York Water Dist., c/o C. S. Menzie, Fowlerville, water sys. $175,000. W. P. Eshbaugh, Geneseo., engr

Bids Asked April 3

Pa., Media—Boro, filter equip. Over $25,000. Albright & Friel, 1520 Locust St., Phila., engrs.

LOW BIDDERS

Calif., San Diego—City, Mar. 11, constructing Pacific Beach pipelines, from H. L. Foster, 2260 Main St., **$80,707**; furnishing c.i. pipe, from U. S. Pipe & Fdry. Co., 448 S. Hill St., Los Angeles, **$156,362**. CD 3/4.

†**Ga., Conley**—Con. Q.M., 101 Marietta St., Atlanta, Mar. 13, water sys. and utilities at General Depot, from Espy Paving & Constr. Co., 108 E. Bay St., Savannah. **$299,500.** CD 2/19—ENR 2/27.

La., Jennings—At office Hon. L. T. Moses, mayor, Mar. 12, water purification plant, from Gravier & Harper, Alexandria. **$39,330.** CD 2/17—ENR 2/20.

Wash., Camas—City, Mar. 11, 500,000 gal. concrete reservoir, from Frank Watt Constr. Co., 2020 N.E. 58 Ave., Portland, Ore. **$15,700.** H. B. MacMaster, city clk. CD 2/20—ENR 2/27.

CONTRACTS AWARDED

Minn., Barrett—Watermains, **WPA. $35,000.** O. Haugen, city clk.

Fla., High Springs—WW sys. imprvs., well, filter plant, etc., **WPA. $32,500.**

Minn., Monticello—L. L. Hawkins, village recdr., water supply sys., **WPA. $55,995.**

Miss., Grenada—R. S. Sharp, mayor, reservoir for water sys., **WPA. $30,000.**

Minn., Long Prairie—R. L. Hawkins, clk., water supply sys., **WPA. $31,324.**

N. C., Booneville—H. B. Gentry, mayor, water and sewerage sys., **WPA. $70,138.**

N. C., Salisbury—Imprv. water and sewerage sys., **WPA. $295,996.** H. C. Holmes, city mgr. D. C. Dungan, mayor.

Pa., Selinsgrove—General State Auth., Dpt. Pub. Welfare, 2 and Locust Sts., Harrisburg, reservoir for water supply sys., modern street lighting sys., etc., **WPA. $70,000.** CD 3/4—ENR 3/6.

Tex., Houston—C. A. Pickett, mayor, 3 mg. steel storage tank and 110 ft. tower, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. **$45,590.** Est. $60,000. G. L. Gugate, Houston, ch. engr Waterworks.

Tex., San Antonio—M. Maverick, mayor, water facilities for new airport, Purchase and Hire. **$30,000.** Phelps & DeWees & Simmons, Majestic Bldg., archts. H. R. F. Helland & F. Drought, Frost Bldg., engrs.

Man., Winnipeg—G. F. Bentley, municipality clk., watermains, sewers in several streets incl. Carter and McAdam Aves., day labor. **$30,000.** W. H. Bretherton, City Hall, engr.

Ont., Newmarket—N. L. Matthews, municipality clk., well drilling, to International Water Supply Co. Ltd., 12 Maitland St., London, **$18,000.**

Que., Louiseville—R. R. Beland, municipality clk., watermains, well drilling, day labor. **$35,000.** CD 2/19—ENR 2/27.

Que., Mont Laurier—New watermains, day labor. **$40,000.** J. Brett, 4180 Melrose Ave., Montreal, engr.

Sask., Yorkton—Dpt. Natl. Defense for Air, Ottawa, Ont., water and sewer services at Service Flying Training School 11, to Poole Constr. (Saskatchewan) Ltd., Hamilton and Eighth Sts., Regina. **$25,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ark., Little Rock—Exten., repairing sewerage sys. $120,000. R. A. Boyce, city engr.

Calif., East Salinas—Alisal Sanitary Dist. voted $170,000 bonds complete sewerage sys. C. C. Kennedy, 604 Mission St., San Francisco, engr. CD 2/6—ENR 2/13.

Calif., Madera—Plans $50,000 bond election, imprv., exten. sewerage sys.

Calif., Newman—Voted $45,000 bonds, sanitary sewer line, septic tank, 2½ mi. west of city. CD 1/29—ENR 2/6.

★**Calif., San Diego**—$1,983,000 bond election, Apr. 22, trunk and lateral sewers. F. W. Sick, city clk.

Calif., San Mateo—Sewers in 22 Ave., Terrace Way, etc. Over $25,000.

Calif., Sunnyvale—$108,000 bond election Apr. 8, outfall sewer.

Fla., Pensacola—Sewage pump. sta. to serve Fisherville sect. Over $25,000. G. J. Roark, city mgr.

Ill., Rushville—I. Payton, city clk., sewerage sys. $66,000.

★**Ind., Terre Haute**—City, Bd. Works, plans $1,000,000 or more bond election, sewerage sys.

N. Y., Cheektowaga—Sewage disposal plant addn. Over $25,000. Nussbaumer & Clarke, Inc., 327 Franklin St., Buffalo, engrs.

N. Y., Kenmore (br. Buffalo)—Town Bd. Tonawanda, Village Hall, Kenmore, Buffalo, C. A. Tilghman, clk., sanitary sewers Dumont Terrace, sanitary sewers, watermains in Sewer and Water Dist. 3, sanitary sewers and appurtenances Fairbanks Ave.; watermains Fairbanks Ave.; street paving afterwards, etc. $25,000. Township Eng. Dpt., Village Hall, engr.

★**N. Y., Poughkeepsie**—Dpt. P. Wks., City Hall, sewage plant, sewerage sys. $900,000. G. D. Holmes, Syracuse Bldg., Syracuse, engr.

O., Ravenna—Bids in about 60 days, sewage disposal plant. $153,400.